STATE OF CALIFORNIA

AIR RESOURCES BOARD

EMISSION INVENTORY
1995

PREPARED BY:

Technical Support Division
Emission Inventory Branch
October 1997

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ACKNOWLEDGEMENT

The 1995 Emission Inventory was prepared by the staff of the Emission Inventory Branch under the direction of Linda Murchison, Chief of the Emission Inventory Branch; Dennis Goodenow, Manager of the Emission Inventory Systems Section; Dale Shimp, Manager of the Emission Inventory Analysis Section; Richard Bode, Manager of the Emission Inventory Methods Section.

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Special thanks go to the following ARB staff who played a role in preparing this inventory:

Emission Inventory Branch:

Vincent Agusiegbe	Janis Goonan	Don Rake
Andy Alexis	Martin Johnson	Kirk Rosenkranz
Ray Asregadoo	Vivian Lerch	Beth Schwehr
Vijay Bhargava	Darryl Look	Mena Shah
Skip Campbell	Carolyn Lozo	Cheryl Taylor
Andy Delao	Fred Medina	Jan Taylor
Krista Eley	Miki Miyashiro	Patricia Velasco
Steve Francis	Chris Nguyen	Yosh Yajima
Patrick Gaffney	April Nitsos	

Other Contributors:

Mobile Source Control Division
Office of Air Quality and Transportation Planning
Information Systems Branch

INTRODUCTION

Section 39607(b) of the California Health and Safety Code requires the Air Resources Board (ARB) to inventory sources of air pollution within the air basins of the state and to determine the kinds and quantities of the air pollutants that come from those sources. The statute requires that the Board use, to the fullest extent, the data of local agencies in fulfilling this purpose.

This emission inventory for 1995 was compiled by the ARB staff in accordance with Section 39607(b). Point source emission estimates in the inventory were provided by the air pollution control districts and the air quality management districts. Area source emission estimates were made by either the districts or the ARB staffs. On-road motor vehicle emission estimates were made by the ARB staff.

The emission estimates in this report are in tons per average day, determined by dividing annual emissions by 365. The estimates have been rounded off to two significant figures. Estimates that are less than 0.05 ton per day are shown as dashes.

Emissions of seven criteria air pollutants are compiled in this report. The pollutants are total organic gases (TOG), reactive organic gases (ROG), carbon monoxide (CO), oxides of nitrogen (NOx), oxides of sulfur (SOx), particulate matter (PM), and particulate matter with an aerodynamic diameter of 10 micrometers or smaller (PM10). Some of these pollutants are precursors to other pollutants. For example, oxides of nitrogen and reactive organic gases are precursors to the formation in the atmosphere of oxidants such as ozone. Some of the oxides of nitrogen and oxides of sulfur emitted in the gaseous state are converted to nitrate and sulfate particulates, respectively.

An overview of the total emissions in the state and the air basins is presented in Chapter I together with demographic and geographic information. Chapter II explains the major source categories and summary categories found in the Appendix of this document. Chapter III contains a discussion of the data format and descriptions of the pollutants reported in the Emission Inventory Tables. Chapter IV outlines the methods used to compile the emission estimates for point sources, area sources and on-road motor vehicles. Emission estimates by source category for each of the pollutants are tabulated in the Appendix for the state, for each of the 14 air basins, and for each county or air basin portion of a county.

Some emission estimates in this report could be improved by using methods or data developed since the original estimates were made. Recommendations for improvement should be brought to

the attention of:

Air Resources Board
Technical Support Division
Emission Inventory Branch
P. O. Box 2815, Sacramento, CA 95812

Recommendations to change emission estimates will be evaluated, provided they are supported by adequate technical documentation. Any questions or requests for copies of this document should be directed to the Emission Inventory Branch of the ARB at (916) 322-6077.

CHAPTER I

1995 EMISSION SUMMARIES

California Summary

California is divided into fourteen air basins whose boundaries are based on geographical and meteorological considerations. The air basin boundaries follow political boundaries to the extent practicable. The air basins are shown in Figure I-1. The population, area, and emissions for the state and for each air basin are shown in Table I-1. The population estimates used in this document are from the California Department of Finance Report "Population Estimates for California State and Counties", Report 95E-2, May 1996. The county population portions within an air basin are based on the information received from the California Department of Finance Report "Department of Finance Air Basin Estimates, for California", 1-1-92 to 1-1-93, May 1993. The Los Angeles County and Riverside County portions within South Coast and Southeast Desert air basins are based on information from the South Coast Air Quality Management District.

Air Basin Summaries

Table I-2 through I-15 show the population, area and total emissions for each of the air basins and for each county or portion of a county that is included within the air basin.

Inventories by Source Category

The Appendix contains inventories of emissions by summary category for the state, air basins, and the counties.

Comparison with Prior Inventories

Differences in emission estimates between this inventory and previous inventories compiled by the ARB may be due to a number of reasons including: emission controls, changes in business or industrial activity, different methods of estimation, and the availability of more complete data.

Comparison with District Inventories

District inventories may differ from the ARB inventories for the same inventory year because local inventories are 1) sometimes prepared for a geographical area other than a complete county, 2) prepared for specific day or season rather than average annual day, 3) prepared with sources aggregated into different categories. It is necessary to review the documentation supporting the inventories in order to understand the differences in each case.

FIGURE I-1

CALIFORNIA AIR BASINS

This figure is unavailable in electronic format.

TABLE I-1

CALIFORNIA SUMMARY
POPULATION, AREA, AND EMISSIONS BY AIR BASIN
1995

AIR BASIN	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Great Basin Valleys	30,170	13,880	17	14	100	10	1.0	87	53
Lake County	55,100	1,260	17	12	94	6.2	0.5	19	13
Lake Tahoe	43,934	500	13	9.9	110	3.5	0.2	6.9	4.6
Mountain Counties	380,266	12,500	130	99	740	60	4.9	170	110
North Central Coast	645,950	5,160	270	79	470	81	4.6	120	66
North Coast	304,335	12,270	140	67	580	54	4.6	120	76
Northeast Plateau	83,350	14,920	57	43	450	37	2.0	120	79
Sacramento Valley	2,138,635	15,040	480	310	2000	270	12	410	240
San Diego	2,669,200	4,260	560	270	1800	240	12	190	110
San Francisco Bay Area	6,244,220	5,540	1100	550	3700	570	80	260	160
San Joaquin Valley	2,986,295	24,850	1900	570	2500	540	32	810	450
South Central Coast	1,332,500	7,780	330	160	880	130	20	130	77
South Coast	13,904,579	6,530	1800	1200	7200	1200	76	740	430
Southeast Desert	1,244,226	32,420	280	170	1000	320	19	840	410
STATE TOTAL {1}	32,062,760	156,910	7100	3600	22000	3500	280	4000	2300

{1} STATE EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE AIR BASIN EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-2

GREAT BASIN VALLEYS AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Alpine	1,170	723	2.5	2.2	12	0.6	-	3.3	2.2
Inyo	18,450	10,130	6.4	5.3	45	6.2	0.8	45	26
Mono	10,550	3,027	8.5	6.8	46	3.6	0.2	39	24
AIR BASIN TOTAL {1}	30,170	13,880	17	14	100	10	1.0	87	53

{1} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-3

LAKE COUNTY AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Lake	55,100	1,260	17	12	94	6.2	0.5	19	13

TABLE I-4

LAKE TAHOE AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
El Dorado {1}	31,724	350	9.1	7.2	79	2.5	0.2	4.8	3.2
Placer {1}	12,210	150	3.7	2.7	27	1.0	0.1	2.1	1.4
AIR BASIN TOTAL {2}	43,934	500	13	9.9	110	3.5	0.2	6.9	4.6

{1} THAT PORTION OF THE COUNTY WITHIN THE AIR BASIN.
{2} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-5

MOUNTAIN COUNTIES AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Amador	32,600	593	12	9.2	57	6.6	0.9	15	9.6
Calaveras	36,950	1,032	13	11	70	3.9	0.1	16	11
El Dorado {1}	112,476	1,476	25	19	150	15	1.3	24	16
Mariposa	15,900	1,455	6.2	5.1	33	2.1	0.1	12	7.8
Nevada	86,600	975	21	15	110	11	0.7	26	17
Placer {1}	20,350	1,160	4.6	3.8	28	4.5	0.2	11	6.8
Plumas	20,500	2,569	21	17	140	7.7	0.6	29	19
Sierra	3,390	958	6.0	5.1	37	2.1	0.4	18	11
Tuolumne	51,500	2,279	17	14	110	7.6	0.7	17	11
AIR BASIN TOTAL {2}	380,266	12,500	130	99	740	60	4.9	170	110

{1} THAT PORTION OF THE COUNTY WITHIN THE AIR BASIN.
{2} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-6

NORTH CENTRAL COAST AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Monterey	361,800	3,320	150	47	290	55	2.8	74	41
San Benito	42,650	1,400	18	5.2	35	7.0	0.4	21	12
Santa Cruz	241,500	440	100	26	150	19	1.4	22	13
AIR BASIN TOTAL {1}	645,950	5,160	270	79	470	81	4.6	120	66

{1} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-7

NORTH COAST AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Del Norte	27,600	1,000	16	6.4	99	3.8	0.3	13	9.4
Humboldt	124,500	3,590	53	25	210	24	2.5	34	23
Mendocino	84,300	3,510	30	18	140	16	1.4	31	20
Sonoma {1}	54,535	980	27	11	64	6.3	0.3	9.3	5.7
Trinity	13,400	3,190	10	6.6	67	2.9	0.2	28	18
AIR BASIN TOTAL {2}	304,335	12,270	140	67	580	54	4.6	120	76

{1} THAT PORTION OF THE COUNTY WITHIN THE AIR BASIN.
{2} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-8

NORTHEAST PLATEAU AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Lassen	28,650	4,560	16	13	94	10	0.7	38	24
Modoc	10,050	4,100	5.5	4.0	40	5.3	0.4	33	20
Siskiyou	44,650	6,260	36	26	320	21	1.0	49	35
AIR BASIN TOTAL {1}	83,350	14,920	57	43	450	37	2.0	120	79

{1} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-9

SACRAMENTO VALLEY AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Butte	196,100	1,670	35	29	170	21	0.9	49	29
Colusa	17,850	1,150	19	11	90	12	0.4	41	24
Glenn	26,600	1,320	17	11	72	10	0.6	31	18
Placer {1}	170,940	420	33	27	190	26	1.0	20	13
Sacramento	1,117,700	970	230	120	730	94	3.2	72	42
Shasta	160,900	3,793	40	31	260	33	1.9	47	32
Solano {1}	107,445	470	29	18	86	14	0.9	19	11
Sutter	73,800	600	24	15	98	10	0.4	32	19
Tehama	54,200	2,980	16	12	96	17	1.0	27	17
Yolo	150,800	1,030	30	24	140	20	0.9	55	31
Yuba	62,300	640	13	11	65	9.0	0.5	15	9.0
AIR BASIN TOTAL {2}	2,138,635	15,040	480	310	2000	270	12	410	240

{1} THAT PORTION OF THE COUNTY WITHIN THE AIR BASIN.
{2} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-10

SAN DIEGO AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
San Diego	2,669,200	4,260	560	270	1800	240	12	190	110

TABLE I-11

SAN FRANCISCO BAY AREA AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Alameda	1,347,700	730	220	110	770	120	8.6	50	30
Contra Costa	867,300	730	190	99	600	120	38	46	28
Marin	238,900	520	44	23	180	19	0.5	11	6.4
Napa	117,800	790	23	12	75	9.1	0.2	7.6	4.8
San Francisco	751,500	45	60	46	290	41	7.6	17	11
San Mateo	689,700	450	130	61	450	64	2.0	27	16
Santa Clara	1,603,300	1,300	270	130	910	130	4.4	71	42
Solano {1}	263,055	360	58	35	190	37	18	17	11
Sonoma {1}	364,965	620	60	31	230	28	0.8	17	11
AIR BASIN TOTAL {2}	6,244,220	5,540	1100	550	3700	570	80	260	160

{1} THAT PORTION OF THE COUNTY WITHIN THE AIR BASIN.
{2} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-12

SAN JOAQUIN VALLEY AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Fresno	754,100	5,970	540	120	580	110	9.8	230	130
Kern {1}	524,195	5,580	350	160	520	160	7.7	120	70
Kings	114,900	1,400	130	34	99	25	1.1	70	37
Madera	106,400	2,150	61	22	120	30	1.3	43	24
Merced	198,500	1,980	140	41	230	44	2.4	91	51
San Joaquin	524,600	1,420	140	67	390	74	5.4	83	46
Stanislaus	413,800	1,510	370	65	280	48	2.8	70	39
Tulare	349,800	4,840	210	62	330	47	1.5	98	56
AIR BASIN TOTAL {2}	2,986,295	24,850	1900	570	2500	540	32	810	450

{1} THAT PORTION OF THE COUNTY WITHIN THE AIR BASIN.
{2} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-13

SOUTH CENTRAL COAST AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
San Luis Obispo	228,400	3,180	41	31	220	34	15	50	31
Santa Barbara	391,400	2,740	180	59	260	38	2.5	35	22
Ventura	712,700	1,860	110	73	410	60	2.7	42	24
AIR BASIN TOTAL {1}	1,332,500	7,780	330	160	880	130	20	130	77

{1} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-14

SOUTH COAST AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Los Angeles {1}	9,071,634	2,770	1000	750	4300	720	62	380	220
Orange	2,614,800	770	330	250	1500	200	5.5	120	68
Riverside {1}	1,000,313	1,850	190	100	660	120	3.8	120	71
San Bernardino {1}	1,217,832	1,140	220	130	700	130	4.4	130	71
AIR BASIN TOTAL {2}	13,904,579	6,530	1800	1200	7200	1200	76	740	430

{1} THAT PORTION OF THE COUNTY WITHIN THE AIR BASIN.
{2} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

TABLE I-15

SOUTHEAST DESERT AIR BASIN
POPULATION, AREA, AND EMISSIONS BY COUNTY
1995

COUNTY	POPULATION	AREA SQUARE MILES	EMISSIONS, TONS/DAY						
			TOG	ROG	CO	NOX	SOX	PM	PM10
Imperial	137,400	4,240	39	34	160	38	1.7	290	150
Kern {1}	92,505	2,570	25	12	73	32	3.6	53	30
Los Angeles {1}	280,566	1,300	34	17	95	19	0.6	43	27
Riverside {1}	369,987	5,330	62	48	370	68	1.7	98	54
San Bernardino {1}	363,768	18,980	120	53	340	160	12	350	150
AIR BASIN TOTAL {2}	1,244,226	32,420	280	170	1000	320	19	840	410

{1} THAT PORTION OF THE COUNTY WITHIN THE AIR BASIN.
{2} AIR BASIN EMISSION TOTAL MAY NOT EQUAL THE SUM OF THE COUNTY EMISSION TOTALS BECAUSE OF ROUNDING.

CHAPTER II

EXPLANATION OF THE EMISSION INVENTORY SUMMARY CATEGORY FORMAT

The emission inventory tables in the appendix of this document summarize emissions in emission inventory summary category format. This format provides a concise summary of the inventory for "Stationary", "Area-wide", "Mobile", and "Natural" sources for a county, air basin, or the entire state. Stationary source emissions are divided into five major source categories and 30 summary categories. Area-wide emissions are divided into two major source categories and 16 summary categories. Mobile source emissions are divided into two major source categories and 19 summary categories. Natural Source emissions are divided into 5 summary categories. These major source categories and summary categories are summarized in Table II-1. These summary categories could be further desegregated by using source categories, categories of material and source sub categories. This chapter will explain how emissions are categorized in the emission inventory summary category format.

Each point source emission estimate in the inventory data base is assigned a Source Classification Code (SCC) and a Standard Industrial Classification (SIC) code. Each area source category is assigned a 14 digits Emission Inventory Code (EIC). In turn, each valid SCC/SIC combination used in the point source inventory is assigned an EIC. These emission inventory codes are then used to assign emission estimates to appropriate summary categories.

DESCRIPTIONS OF SUMMARY CATEGORIES

STATIONARY SOURCES

The major source categories and summary categories for stationary sources are explained below. The source category codes below correspond to the summary category numbers in Table II-1.

Fuel combustion - This major source category accounts for the emissions from burning fuel in industrial and commercial sectors. The summary categories under this major source category are explained below.

010 Electric Utilities - Includes boilers, turbines, and internal combustion engines used in electric generating plants.

020 Cogeneration - Includes boilers, turbines, and internal combustion engines used in cogeneration plants.

030 Oil and Gas Production - Includes steam generators, boilers, heaters, internal combustion engines, turbines, and drilling and workover rigs used in oil and gas production.

040 Petroleum Refining - Includes boilers, heaters, and internal combustion engines used in petroleum refining and related industries.

050 Manufacturing and Industrial - Includes boilers, heaters, ovens, stoves, furnaces, internal combustion engines and in-process fuels used in manufacturing industries such as lumber and wood products, paper and allied products, and chemical and allied products.

052 Food and Agricultural Processing - Includes orchard heaters, space heaters, boilers, and internal combustion engines used in food and agricultural production and service industries such as food and kindred products.

060 Service and Commercial - Includes boilers, turbines, heaters, internal combustion engines used in service and commercial industries, such as petroleum and gas marketing, printing and publishing, health and education services, and dry cleaning services.

099 Other (Fuel combustion) - Includes fuel combustion operation not specified in the summary categories above. This summary category also includes resource recovery operations.

Waste Disposal - This major source category accounts for the emissions from disposal of industrial, commercial and residential wastes. The summary categories under this major source category are explained below.

110 Sewage Treatment - Includes sewage treatment plants, incineration of sewage sludge, waste gas flares and fugitive emissions from sewer lines.

120 Landfills - Includes biodegradation of in-place municipal refuse at Class II-2 landfills and disposal of hazardous waste in Class II-1 landfills.

130 Incinerators - Includes single- and multi-chamber incinerators with or without auxiliary fuel.

140 Soil Remediation - Includes soil treatment using aeration/land farming, adsorption, or oxidation process.

199 Other (Waste Disposal) Includes any other waste disposal process not specified in the summary categories above including volatile organic waste disposal (evaporation) and decomposition of biological wastes such as farming, agricultural or cannery products

Cleaning and Surface Coatings - This major source category accounts for the emissions from the use of all petroleum based and synthetic solvents in industrial and commercial sectors. The summary categories under this major source category are explained below.

210 Laundering - Cleaning of clothes and other fabrics with petroleum based or synthetic solvents. Dry cleaning establishments and commercial laundries are included in this category.

220 Degreasing - Vapor and liquid degreasing operations using petroleum based and synthetic solvents.

230 Coatings and Related Process Solvents - Painting and all surface coatings, except architectural coatings, including applications in spray booths and bake ovens.

240 Printing - Raw ink, extenders or varnishes, and solvents from rotogravure, flexographic, lithographic and screen printing including photocopy shops and retail printing shops.

299 Other (Cleaning and Surface Coatings) - Organic solvents used for cleaning and in surface coatings for any activity not specified in the summary categories above including photography labs and adhesives and sealants.

Petroleum Production and Marketing - This major source category accounts for fugitive emissions from petroleum processing, storage and transfer activities. The summary categories under this major source category are explained below.

310 Oil and Gas Production - Drilling oil and gas wells, pumping and pre-treating crude oil and gas, and gas condensation and storage including fugitive losses, cooling towers, wastewater treatment, and vapor recovery/flares.

320 Petroleum Refining - Processing of crude oil to make finished, salable products including fugitive losses, cooling towers, wastewater treatment, vapor recovery/flares, catalytic cracking, and sulfur plants.

330 Petroleum Marketing - The transfer of products from production fields to refineries; storage and distribution of the refined products including storage at and transfer from bulk terminals, bulk plants, and service stations; vehicle refueling; and marine petroleum loading, unloading. This category also includes breathing losses from tank cars, tanker trucks (cargo tanks), and ships in-transit.

399 Other (Petroleum Production and Marketing) - Petroleum processing, storage and transfer activities not specified in the summary categories above.

Industrial Processes - This major source category accounts for the emissions from industrial processes producing articles of commerce. The summary categories under this major source category are described below.

410 Chemical - Production, storage and processing of chemicals including paints and fertilizers, rubber and rubber

products, fiberglass and fiberglass products, plastic and plastic products, and sodium carbonate (soda ash).

420 Food and Agricultural - Cleaning, storage, and processing of food and agricultural products including wine fermentation, wine aging, bakeries, breweries, and distilleries.

430 Mineral Processes - Processing rock and clay, mixing concrete, manufacturing of cement and asphalt roofing materials, sand and gravel excavation, surface blasting, and gypsum, lime, and diatomaceous earth manufacturing.

440 Metal Processes - Production of metal from ore, recovery of metal from scrap or salvage, smelting of metals, metal plating, coating, and machining operations.

450 Wood and Paper - Production of particle board, plywood, paper, paper products, cardboard, etc. This summary category also includes lumbering, sanding, and sawing of raw materials.

460 Glass and Related Products - Processing and storage of materials in manufacturing of glass and glass products.

470 Electronics - Processing and storage of materials in manufacturing of electronic goods including semiconductors and discs.

499 Other (Industrial Processes) - Industrial processes for any activity not specified in the summary categories above.

AREA-WIDE SOURCES - Area-wide sources are considered area-wide sources where the emissions are spread over a wide area and not reported in the stationary source inventory. The major source categories and summary categories for area-wide sources are explained below.

Solvent Evaporation - This major source category accounts for the emissions from the use of all petroleum and synthetic solvents in industrial, commercial and residential sectors. The summary categories under this major source category are explained below.

510 Consumer Products - Aerosol and non-aerosol consumer products such as deodorants, household cleaners, paints, solvents etc.

520 Architectural Coatings and Related Process Solvents - Architectural painting with water-based and oil-based coatings and the associated use of clean-up and thinning solvents.

530 Pesticides/Fertilizers - All agricultural, commercial, domestic, industrial, and governmental usage of pesticides such as insecticides, herbicides, and fungicides.

540 Asphalt Paving - The application of various forms of asphalt in construction and maintenance of roads, streets, parking lots, shopping center grounds, driveways, industrial pavements, and other unspecified

550 Refrigerants - The use of refrigerants for industrial, commercial and residential refrigeration. Also includes refrigeration in mobile refrigeration units.

599 Other (Solvent Evaporation) - Solvent evaporation for any activity not specified in the summary categories above including asphalt roofing operations, pavement marking, and off-gassing of manufactured products.

Miscellaneous processes - This major source category accounts for the emissions from processes not classified in other major source categories. The summary categories under this major source category are described below.

610 Residential Fuel Combustion - Heaters, stoves, furnaces, fire places, and clothes dryers in domestic use.

620 Farming Operations - Particulate matter stirred up by soil tilling, harvest operations, growing season operations, and cattle feedlots. It also includes fugitive emissions from livestock wastes, crop storage, and any other activities related to farming operations.

630 Construction and Demolition - Particulate matter from demolition, construction of roads and residential, commercial, industrial, or recreational construction projects.

640 Paved Road dust - Particulate matter stirred up by vehicle travel along paved roads including freeways, major streets, collector streets, and local streets.

645 Unpaved Road Dust - Particulate matter stirred up by vehicle travel along dirt and gravel (unpaved) roads including city and county roads, U.S. forest and park roads, timber production roads, B.L.M. roads, and farm roads.

650 Fugitive Windblown Dust - Windblown dust emissions from agricultural lands, pasture lands, and unpaved areas.

660 Fires - Structural, mobile home, and automobile fires.

670 Waste Burning and Disposal - Open burning of agricultural debris including crop stubble, weeds, and orchard prunings. Open burning of brush and weeds to enhance the growth of grass for cattle (range management). Controlled open burning to remove slash or undergrowth (forest management). Waste burning of any kind not specified in the summary categories above; including planned open burning of trash, leaves, and refuse from all activities except agricultural

operations, range management and weed control. This category also includes the disposal of septic tanks and pits and portable toilets.

680 Utility Equipment - Two and four-stroke engines less than 20 horse power used in lawn and garden equipments, chain saws, and general utility equipments.

699 Other (Miscellaneous Processes) - Miscellaneous processes for any activity not specified in the summary categories above, including unspecified fuel combustion, and evaporation, and process loss. Currently, this category includes activities such as commercial cooking, welding and soldering, research and testing laboratories, auto wrecking fugitive losses, car washes, pavement sweeping, and cleaning.

MOBILE SOURCES

Mobile sources include two major categories, on-road vehicles and other mobile sources. The major source categories and summary categories for mobile sources are explained below.

On-road Motor Vehicles - This major source category accounts for the emissions from all vehicles licensed to travel on public roads and highways. The summary categories under this major source category are explained below.

710 Light Duty Passenger - Gasoline-powered and diesel-powered passenger cars with a gross vehicle weight equal to or less than 6,000 pounds.

722 Light Duty Trucks - Light duty trucks are gasoline-powered and diesel-powered trucks with a gross vehicle weight equal to or less than 6,000 pounds.

724 Medium Duty Trucks - Medium duty trucks are gasoline-powered and diesel- powered trucks with a gross vehicle weight of 6,001 to 8,500 pounds.

732 Light Heavy Duty Gas Trucks - Gasoline powered trucks with a gross vehicle weight 8,501 to 14,000 pounds.

734 Medium Heavy Duty Gas Trucks - Gasoline powered trucks with a gross vehicle weight 14,001 to 33,000 pounds.

742 Light Heavy Duty Diesel Trucks - Diesel powered trucks with a gross vehicle weight 8,501 to 14,000 pounds.

744 Medium Heavy Duty Diesel Trucks - Diesel powered trucks with a gross vehicle weight 14,001 to 33,000 pounds.

746 Heavy Heavy Duty Diesel Trucks - Diesel powered trucks with a gross vehicle weight greater than 33,000 pounds.

750 Motorcycles - Motorized vehicles with two or three wheels in contact with the ground.

760 Heavy Duty Diesel Urban Buses - Buses with a gross vehicle weight greater than 33,000 pounds used for urban transportation.

799 Other (on-road Motor Vehicles) - Any on-road motor vehicle activity not specified in the summary category above.

Other mobile Sources - This major source category accounts for vehicular emissions not included in the On-road Vehicles major source category. The summary categories under this major source category are explained below.

810 Aircraft - Commercial, private, military, and government aircraft. Activities include warm-up, taxiing, takeoff, climbing, approaching, and landing operations taking place below 3,500 feet above ground level. This summary category also includes aircraft activities during agricultural seeding, dusting, and spraying operations. The emissions resulting from the material being sprayed or dusted are included in the "Pesticide" summary category under Area-Wide Sources.

820 Trains - Railroad hauling and switching. Breathing losses from tank cars in transit are included in the "Petroleum Marketing" summary category under Stationary Sources.

830 Ships and Commercial Boats - U.S. and foreign steam ships, motor ships, other ships, and tugboats during maneuvering, berthing, hotelling, and while in-transit (cruising). This category also includes commercial fishing boats, crew, and supply boats for offshore oil production. Breathing losses from tanker/barge in-transit are included in the "Petroleum Marketing" summary category under Stationary Sources.

840 Recreational Boats - Inboard and outboard pleasure crafts.

850 Off-road Recreational Vehicles - Recreational motorcycles, snowmobiles, all-terrain vehicles (ATV's), four-wheel drive vehicles, and any other off-road vehicles.

860 Commercial/Industrial Mobile Equipment - Light-duty commercial and industrial equipment such as forklifts; heavy-duty equipment used in mining, and construction, such as tractors and graders; and mechanical refrigeration units used on trucks and commercial trailers.

870 Farm Equipment - Light and heavy duty equipment used in farming.

899 Other (Other Mobile Sources) - Any other mobile source activity not specified in the summary category above.

NATURAL (NON-ANTHROPOGENIC) SOURCES

Natural sources - This major source category accounts for emissions from non-anthropogenic sources. The summary categories under this major source category are explained below.

910 Biogenic Sources - Organic gas emissions from agricultural vegetation and all other types of vegetation.

920 Geogenic Sources - Petroleum seeps including natural seepage of oil and gas occurring in both offshore and onshore locations.

930 Wildfires - Wildfires involving grass, woodland, timber, and brush.

940 Windblown Dust - Windblown dust emissions from undisturbed areas.

999 Other (Natural Sources) - Natural sources not included in the summary categories above.

TABLE II-1

SUMMARY CATEGORY

STATIONARY SOURCES

FUEL COMBUSTION
- 010 Electric Utilities
- 020 Cogeneration
- 030 Oil and Gas Production (Combustion)
- 040 Petroleum Refining (Combustion)
- 050 Manufacturing and Industrial
- 052 Food and Agricultural Processing
- 060 Service and Commercial
- 099 Other (Fuel Combustion)

WASTE DISPOSAL
- 110 Sewage Treatment
- 120 Landfills
- 130 Incinerators
- 140 Soil Remediation
- 199 Other (Waste Disposal)

CLEANING AND SURFACE COATINGS
- 210 Laundering
- 220 Degreasing
- 230 Coatings and Related Process Solvents
- 240 Printing
- 299 Other (Cleaning and Surface Coatings)

PETROLEUM PRODUCTION AND MARKETING
- 310 Oil and Gas Production
- 320 Petroleum Refining
- 330 Petroleum Marketing
- 399 Other (Petroleum Production and Marketing)

INDUSTRIAL PROCESSES
- 410 Chemical
- 420 Food and Agriculture
- 430 Mineral Processes
- 440 Metal Processes
- 450 Wood and Paper
- 460 Glass and Related Products
- 470 Electronics
- 499 Other (Industrial Processes)

TABLE II-1 (CONTINUED)

AREA - WIDE SOURCES

SOLVENT EVAPORATION
- 510 Consumer Products
- 520 Architectural Coatings and Related Process Solvents
- 530 Pesticides/Fertilizers
- 540 Asphalt Paving
- 550 Refrigerants
- 599 Other (Solvent Evaporation)

MISCELLANEOUS PROCESSES
- 610 Residential Fuel Combustion
- 620 Farming Operations
- 630 Construction and Demolition
- 640 Paved Road Dust
- 645 Unpaved Road Dust
- 650 Fugitive Windblown Dust
- 660 Fires
- 670 Waste Burning and Disposal
- 680 Utility Equipment
- 699 Other (Miscellaneous Processes)

MOBILE SOURCES

ON-ROAD MOTOR VEHICLES
- 710 Light Duty Passenger
- 722 Light Duty Trucks
- 724 Medium Duty Trucks
- 732 Light Heavy Duty Gas Trucks
- 734 Medium Heavy Duty Gas Trucks
- 742 Light Heavy Duty Diesel Trucks
- 744 Medium Heavy Duty Diesel Trucks
- 746 Heavy Heavy Duty Diesel Trucks
- 750 Motorcycles
- 760 Heavy Duty Diesel Urban Buses
- 799 Other (On-Road Motor Vehicles)

OTHER MOBILE SOURCES
- 810 Aircraft
- 820 Trains
- 830 Ships and Commercial Boats
- 840 Recreational Boats
- 850 Off-Road Recreational Vehicles
- 860 Commercial/Industrial Mobile Equipment
- 870 Farm Equipment
- 899 Other (Other Mobile Sources)

TABLE II-1 (CONTINUED)

NATURAL (NON-ANTHROPOGENIC) SOURCES

NATURAL SOURCES	
910	Biogenic Sources
920	Geogenic Sources
930	Wildfires
940	Windblown Dust
999	Other (Natural Sources)

CHAPTER III

EXPLANATION OF EMISSION INVENTORY TABLES

DATA FORMAT

The emission inventory tables in the Appendix contain estimates of emissions for five stationary, two area-wide, two mobile, and a natural source major source categories and seventy summary categories. The estimates of emissions are expressed in tons per average day. All emission estimates are rounded off to two significant figures. Where a dash is shown, the emissions are less than 0.05 ton per day.

The emission data are presented in units of tons per annual average day, that is, annual emissions divided by 365. This is appropriate for source categories whose emissions are uniformly distributed throughout the year. For other sources, the time distribution of emissions is a factor to consider in modeling and in the development of control strategies. For example, orchard heaters emitted approximately 57 tons per day of carbon monoxide in San Diego County in 1995 during the months of November to February when frost would destroy the citrus crops. These carbon monoxide emissions averaged over the year are only 14 tons per day.

POLLUTANTS REPORTED

The tables contain emission estimates for the pollutants described below:

Total Organic Gases (TOG)

Total organic gases consist of all hydrocarbons, i.e. compounds containing hydrogen and carbon with or without other chemical elements.

Reactive Organic Gases (ROG)

Reactive organic gases include the organic gases defined above, but exclude methane and a number of low molecular weight halogenated organics that have a low rate of reactivity.

Oxides of Nitrogen (NOx)

The emissions of NOx gases (mostly nitric oxide and nitrogen dioxide) are reported as equivalent amounts of NO2.

Oxides of Sulfur (SOx)

The emissions of SOx gases (sulfur dioxide and sulfur trioxide) are reported as equivalent amounts of SO2 .

Carbon Monoxide (CO)

The emissions of CO are for the single species, Carbon monoxide.

Particulate Matter (PM)

Particulate matter refers to small solid and liquid particles such as dust, sand, salt spray, metallic and mineral particles, pollen, smoke, mist, and acid fumes.

Particulate Matter - 10 Micrometers and Smaller (PM10)

PM10 refers to the fraction of particulate matter with an aerodynamic diameter of 10 micrometers and smaller. These particles are small enough to penetrate the lower respiratory tract.

CHAPTER IV

INVENTORY METHODS

The ARB staff compiled this inventory using data from air pollution control districts and air quality management districts, other governmental agencies, consulting firms, research studies, literature, and other sources.

For TOG, CO, NOx, SOx, and PM, point source emission estimates are based on data collected by the districts. Area source emission estimates for these same pollutants are based on data compiled by the districts and the ARB staff. On-road motor vehicle emission estimates are made by the ARB staff. The methods used to estimate emissions from these sources differ, as explained below. For ROG and PM10, the emission estimates for point, area, and on-road motor vehicle sources are calculated from TOG and PM, respectively, using reactive organic gas fractions and particle size fractions.

Point Sources

Emissions from a point source occur at a facility that can be identified by name and location and which emits a sizable quantity (i.e. more than 10 tons per year[1]) of any one criteria pollutant. A facility may have many individual, identifiable sources (points) of emissions. For example, a coffee processing facility may have a boiler, roaster, grinder, and packaging station as emission points. In addition, a point source may have one or more processes or operations. For example, a boiler burning natural gas part-time and oil part-time is considered to have two processes because the emission rates are different for the two fuels.

The emissions data are presented in units of tons per average day, that is, annual emissions divided by 365. These emissions are computed as the product of a use factor (an indicator of the extent of the activity per unit time) and an emission factor (the quantity of pollutant emitted per unit of the use factor). Point-source use factors usually relate to a process rate, such as the amount of fuel oil consumed in a boiler or the amount of asphalt concrete produced at a batch plant. Emission factors are derived from tests that relate emissions to the process causing the emissions. When adequate source test data are available for a particular point source, these data are used to derive emission factors for the emission calculations. When adequate source test data for a source are not available, the emissions are usually calculated using district or EPA

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[1]Some districts currently include less than 10 tons per year sources in their point source emission inventory.

published emission factors derived from tests of similar facilities or processes. In some cases, it is possible to determine emissions using a materials balance which reconciles the amounts of materials that enter and leave a process.

The ARB staff stores and maintains point source data supplied by the districts in the California Emission Inventory Development And Reporting System (CEIDARS) and also reports these data to the U.S. Environmental Protection Agency.

Area Sources

Most area sources are small sources individually emitting less than 10 tons per year and are not accounted for in the point source portion of the CEIDARS data base. Some examples of area sources are stationary sources, such as residential space heating, gasoline service stations, and small dry cleaners; area-wide sources (widely dispersed sources with no defined points of emissions), such as agricultural burning, pesticide applications, architectural coatings, and consumer products (e.g. aerosol sprays); and other mobile sources, such as railroad locomotives, aircraft, and construction equipments. On-road motor vehicles are also area sources, but their emissions are assessed separately, as discussed later in this chapter.

Area source emission estimates are developed by the districts and by the ARB staff. Area source data provided by the districts are used in the inventory when they more accurately reflect the district emissions than do the ARB data or when the ARB has no data for the category. District data are reviewed and evaluated by the ARB staff before they are included in the inventory. For certain other categories, data for making the estimates are more easily obtained at the state level. For example, data on wildfire incidence and extent are reported by the California Department of Forestry for each county in the state and by the U.S. Forest Service for each national forest. Because the wildfire activity data for California are readily available for the state as a whole from two data sources, it is a more efficient use of resources to have a centralized estimation of emissions for the state. The emission estimates can then be apportioned to individual counties and air basins according to the activity data rather than requiring each of the districts to estimate emissions using the same data.

On Road - Motor Vehicles

On-road motor vehicles are those vehicles which travel on public roads. This category consists of gasoline-powered and diesel-powered passenger cars, light-duty trucks (6,000 lbs. GVW[2] or less), medium-duty trucks (6,001 - 8,500 lbs. GVW), heavy-duty trucks (over 8,500 lbs. GVW), urban buses, and motorcycles.

[2] GVW - Gross Vehicle Weight

Emissions from motor vehicles include exhaust, evaporative, crankcase, and tire-wear emissions. Motor vehicle emissions are calculated as the product of a use factor and an emission rate. Usage data such as number of registered vehicles, annual vehicle miles traveled, and number of vehicle trips are used for estimating motor vehicle emissions. Usage data have been developed by the ARB using California Department of Transportation (Caltrans) travel estimates, local councils of government travel estimates, and Department of Motor Vehicles registration information. The current version of the program (BURDEN7G) used by the ARB in estimating emissions for the on-road vehicles is documented in the ARB publication Methodology for Estimating Emissions from On-Road Motor Vehicles, Volume IV: BURDEN7G, November 1996.

Fleet-wide emission factors are calculated using initial emission factors, deterioration rates, and adjustment factors for individual model years. The emission factors used in estimating emissions are documented in the ARB publication Methodology for Estimating Emissions from On-Road Motor Vehicles, Volumes II: EMFAC7G, November 1996.